

Catalogue of **Sphagnum Peat Mosses**

in *Amgueddfa Cymru-National Museum Wales*

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This is an analysis of *Sphagnum* specimens at NMW. The file *Sphagnum Catalogue Database.xls* and *Sphagnum Catalogue Data Printable.xls* contain the full specimen data and can be accessed/downloaded from Amgueddfa Cymru-National Museum Wales website.

1.0 Introduction

Peat mosses are of fundamental importance to the ecosystems in which they grow, particularly wetlands, and in the formations of peat bogs. Museum collections form the basis of our understanding of plants and animals by providing a resource for accurate identification and a sound taxonomic foundation. Our capacity to undertake ecological projects, such as environmental surveys and monitoring, depend substantially on access to collection information. To this end this catalogue aims to make accessible the information relating to the *Sphagnum* specimens held at National Museum of Wales (NMW (Holmgren *et al.* 1990)).

Specimens held at NMW include the second largest collection of bryophytes in the United Kingdom with some 280,000 specimens. Included in this number are approximately 18,000 *Sphagnum* specimens which make up this catalogue. Currently there are 84 *Sphagnum* taxa held at NMW. All of the taxa in the current Checklist and Census Catalogue of British and Irish Bryophytes (Hill *et al.* 2008) are represented, plus an additional 46 non-British taxa. These overseas specimens make up approximately 30% of the bryophyte collection (see Species Synopsis; section 2.3, page 14).

This catalogue lists all *Sphagnum* specimens held at NMW. Collection details of each specimen are listed with locality, date collected, and collectors' names. In addition, the introduction includes a description of the history and formation of the herbarium at NMW and current curatorial practices. Details of major *exsiccatae*, herbaria and personal collections held at NMW are described, with an analysis of the *Sphagnum* collection. Included is an annotated list of accepted taxa used, with any synonyms that were encountered whilst compiling the list.

1.1 The Bryophyte Herbarium at NMW

1.1.1 History

In 2007, NMW celebrated its centenary, looking back to the date when the museum received a Royal Charter from King Edward VII. This has been 100 years dedicated to collecting and sharing the treasures of Wales's environment and culture.

The origins of the botanical collections in Cardiff began in 1867 when Cardiff Naturalists Society formed and influenced the development of Cardiff Free Library, Museum and Schools of Science and Art. The first noteworthy botanical purchase of the society was in 1870 with

the Conway Collection. The first bryophyte specimens were donated to NMW in 1913, shortly after the formation of NMW with the Royal Charter (Harrison 1982).

Subsequent donations were few until the museum relocated to its present site in Cathays Park, Cardiff in 1919. The move necessitated the appointment of Assistant Keeper, A.E. Wade, a bryologist whose inaugural accomplishment was the establishment of a lower plant herbarium. The appointment instigated a rapid expansion of the collection with a series of purchases of important personal collections, including those of D.A. Jones in 1920 and J.A. Wheldon in 1925. A.E. Wade was employed by the museum for 42 years and during this period, 43,000 bryophyte specimens were added to the collection.

The appointment of A.R. Perry as NMW's bryologist in 1971 marked a further period of expansion for the herbarium. During his time here 168,000 specimens were added, including important collections such as those of P.W. Richards, F. Rose, E.C. Wallace and R.D. & J.W. Fitzgerald (see details on collections; section 1.2, page 5). A.R. Perry also donated his personal collection of 10,000 specimens in 1996. In 2000, R. Tangney¹ was appointed Head of Cryptogamic Botany and Bryophyte Curator.

In recent years, the herbarium has continued to expand. Two eminent bryological collections entered NMW in 2001. Since 1970, the British Bryological Society's UK collection (BBSUK) had been housed in NMW, and in 2001, the collection was officially donated. This collection contains approximately 29,000 specimens of British bryophytes, predominantly made up of voucher material for new vice-county records.

Also in 2001, the H.L.K. Whitehouse collection was donated to the museum. This collection includes some 10,000 bryophyte specimens and a unique collection of stereoscopic photographic slides that covers approximately 80% of the British bryophyte flora and almost all of the British *Sphagnum* taxa. The best stereoscopic slides were scanned by J. Sleath from this collection, to represent as many species as possible. These stereoscopic images can be viewed at www.museumwales.ac.uk/biosyb/external/bryophyte/.

Today, the Herbarium provides comprehensive coverage of the British bryophyte flora, in terms of the taxa represented and their distribution. Noteworthy worldwide *exsiccatae* (see section 1.2.2, page 5) further enhance the breadth of the herbarium, bringing the percentage of foreign specimens in the herbarium to a significant 30%. Altogether, this comprises an internationally important collection in terms of scope and quality.

1.1.2 Specimen Storage and Conservation

Beech drawers house the bryophyte specimens within purpose-built steel compactor units. An integrated approach to pest management is taken to reduce pest numbers by minimising

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the elements essential for pest survival and limiting damage to specimens (Pinniger & Meyer 2001). Thus, in the herbarium, we try to achieve a relative humidity of 50%RH, +/- 5% and a temperature of 20°C, +/-2°C.

A regular vacuuming regime reduces dust and debris in the herbarium that could harbour herbarium pests. The majority of herbarium pests are further controlled by periodically freezing specimens down to -20°C or below for five days (Pinniger & Meyer 2001; Pinniger 2003). The bryophyte collections are frozen on a rotational basis with all in-coming material frozen on entry to NMW.

Bryophyte specimen drawers at NMW



Specimens enter the museum in a range of packet types, some requiring little work and others requiring more detailed curation. Curation entails placing the specimen and original packet data into a polyester envelope. These are clear, archival, polyester pockets with adjacent sides open and measuring 93 x 126 mm. The static properties of polyester prevents loss of material and balances the acidity of the specimen and its environment. The polyester also retards degradation of acid paper thus preserving original script.

The envelope is then placed into a packet which is pre-printed with the specimen data. The packet is folded from an A4 sheet of acid-free 100% cotton archival paper. Cotton is less vulnerable to pest damage and more resistant to degradation than paper made from wood pulp. For more details on collection and curation of bryophytes, see Bridson & Forman (1998).

1.1.3 Organisation of the Herbarium

The bryophyte herbarium at NMW is arranged in alphabetical order by genus and species, following taxonomic treatments by Corley *et al.* (1982) and Grolle (1983). Newly described/discovered taxa in the UK are filed in the herbarium following Hill *et al.* (2008).

At the start of each taxon, British and Irish specimens are arranged by the vice-county system (see an explanation of this in section 1.1.4, below). Following this, the European specimens and then the extra-European specimens are both arranged alphabetically, by country.

The catalogue is arranged in the same way as the herbarium. For more notes on the catalogue, see section 2.0; page 13.

1.1.4 The Vice-county System

Vice-counties were originally described for Britain in 1852 (Watson 1852) and for Ireland in 1901 (Praeger 1901). The counties of Britain (and to a lesser extent Ireland) have, quite often changed their boundaries. Consequently, vice-counties, which are stable, conveniently sized geographical areas, were adopted. We use the vice-county system in this catalogue as a convenient and standard way of arranging British and Irish specimen data. A list of vice-counties can be found in Appendix 1, page 26.

The vice-county system is described in Dandy (1969) and Webb (1980). Detailed outlines for use with GIS system of the English, Welsh and Scottish vice-counties boundaries are available on the National Biodiversity Network (2009).

1.2 Principal Collections and Exsiccatae of Bryophytes housed at NMW

Data compiled with the help of Childerhouse (2001), Harrison (1985) and Desmond (1994). Abbreviations for herbaria follow Holmgren *et al.* (1990).

The herbarium of the British Bryological Society, c.40,000 specimens is housed at NMW and is included in this catalogue. These specimens are marked with an asterisk.

1.2.1 Herbaria Incorporated into NMW

We have incorporated several herbaria from other institutions. These are:

Queens Mary College, London University [QMC] 10,900 specimens

University of Bristol [BRIST] Purchased in 1991; c.20,000 specimens

University of Wales, Bangor [UCNW] Acquired between 1993 and 1994; 8,738 specimens

1.2.2 Exsiccatae

The herbarium contains contributions from the following *exsiccatae*:

Australian National Herbarium (CANB) (ed. Streimann H); Musci Australiasiae Exsiccatae from University of Helsinki

Braithwaite R; Sphagnaceae Britannicae Exsiccatae, 1877.

Carrington B & Pearson WH; Hepaticae Britannicae Exsiccatae; 1878-1890

Drummond T; Musci Americani (2 volumes, 1828) donated by M. Paterson in 1945.

Floram Districtii Bacoviensis Exsiccatum donated by Muzeul de Stiintele Naturii in 1973.

Floram Districtii Bacoviensis Exsiccatum donated by Muzeul de Stiintele Naturii in 1974.

Floram Districtii Bacoviensis Exsiccatum (Centuria III) donated by Muzeul de Stiintele Naturii in 1975.

Frahm JP; **Bryophyta Vogesiaca Exsiccata** (Fascicles I-II) donated by Universitat Duisburg, in 1987.

Frahm JP; **Campylopedes Peruviana Exsiccatae**

Frahm JP; **Campylopedes Exsiccatae** (Fascicles I, II, IV)

Gottsche & Rabenhorst; **Hepaticae Europaeae** donated by M. Paterson in 1945.

Hattori S; **Musci Japonica**

Hiroshima University; **Sphagnotheca Japonica, Hiroshima** (Fascicle I) donated by A.J.E. Smith in 1983.

Husnot T; **Hepaticae Galliae, Musci Galliae**

Japanese Exsiccata (Nos 151-200) donated by Iwatsuki and Mizutani in 1991.

Ochyra & Pocs; **Bryophyta Africana Selecta** (11th Centuria) donated 1994.

Pearson WH; **Exsiccata** donated by University of Wales, Cardiff in 1987.

Schiffner V; **Hepaticae Europaeae Exsiccatae** (Fascicles 1-13, 19-20) donated by L. Jones in 1943.

Schiffner V; **Hepaticae Europaeae Exsiccatae** (29 folios) donated by A.D. Banwell in 1968.

Schimper WP; **Muscorum Europaeorum** donated by L.B.C. Trotter in 1964.

Seaward MRD; **Flora Silesiaca Exsiccatae** 100 specimens donated in 1990

Spruce R; **Hepaticae Pyrenaicae** donated by P.W. Richards in 1995.

University of British Columbia (ed. Schofield); **Bryophyta Canadensis** donated by A.J.E. Smith in 1998.

Vitt DH; **Sphagnotheca Boreali-Americana** (Fascicle III) donated by University of Alberta in 1978

Vitt DH; **Sphagnotheca Boreali-Americana** (Fascicle IV) donated by D.H. Vitt in 1982.

1.2.3 Principal Collections

Appleyard J (1906-1989) Donated in 1988; 6,726 specimens

Armitage E (1865-1961) Purchased in 1991 with University of Bristol [BRIST]; c.13,000 specimens

Audus LJ Acquired from S. Agnew in 2000; 406 specimens

Banwell AD Donated in 1997; 4,277 specimens

Benson R de G (1856-1904) Acquired 1915; 900 specimens

Boucher WW Acquired in 1951; 258 specimens

Castell CP (1907-1972) Acquired from London Natural History Society [LNHS] in 1974 and 1988; 3,461 specimens.

Clark WA (1911-1983) Acquired in 1999; 1,500 specimens

Cooke RB (1880-1973) Acquired in 1999; 400 specimens

Darbishire OV (1870-1934) Acquired from BRIST in 1996 and 2000; c.2,000 specimens

Evans EM Acquired in 1996; 766 specimens

Field JH Donated in 1996; c.3,700 specimens

Fitzgerald JW (1908-1989) & Fitzgerald RD (1914-1990) Acquired 1996; c.11,600 specimens

Foster D Acquired from M. Pearman in 1996; c.1,460 specimens

French OBJ Acquired in 1991; 364 specimens

Fry E (1827-1918) Purchased with BRIST. in 1991; 248 specimens

Garlick GW Predominantly from G.W. Garlick in 1988; some from BRIST; in 1991; 5,817 specimens.

- Geyman GG** Acquired from K.J. Adams in 1988; 613 specimens
- Goater B** Acquired in 1999; c.3,000 specimens
- Griffith JE (1843-1933)** Acquired in 1927; 526 specimens.
- Hall R** Acquired in 1999; 1,540 specimens
- Holmes EM (1843-1930)** Purchased in 1922; 2,359 bryophyte specimens.
- Horwood AR (1879-1937)** Acquired in 1923; 1,995 specimens
- Jackett R (1867?-1935)** Acquired in 1971; 344 specimens
- Jones DA (1861-1936)** Acquired in 1920; c.5,500 specimens
- Jones EW (1909-1992)** Acquired in 1996; c.10,100 specimens
- Knight HH (1862-1944)** Donated by A.G. Dixon in 1944; 14,962 specimens.
- Milne-Redhead H (1906-1974)** Acquired from A.J.E. Smith 1975; 984 specimens
- Perry AR** Donated in 1996; c.10,000 specimens
- Peterken JHG (1893-1973)** Donated with BBSUK in 2001; c.3,000 specimens
- Pettifer AJ (1894-1981)** Acquired in 1992; 1,903 specimens
- Reader HP (1850-1929)** Purchased with BRIST; 3,882 specimens
- Richards PW (1908-1995)** Donated in 1976; c.10,000 specimens.
- Rose F (1921-2006)** Donated in 1986; 5,368 specimens.
- Sandwith NY (1901-1965)** Purchased with BRIST in 1991; 259 hepatic specimens
- Smith AJE** Includes ex Herb. H. Milne-Redhead and A.J.E. Smith's collection from 1964 to 1998.
- Trotter LBC (1882-1964)** Acquired from A.J. Pettifer in 1964; 4,093 specimens
- Walker R** Acquired between 1996 and 1999 ; c.3,500 specimens.
- Wallace EC (1909-1986)** Acquired between 1935 and 1996; c.50,000 specimens.
- Wanstall PJ (1924-1993)** Acquired between 1995 and 1997; 1,559 specimens
- Wheldon JA (1862-1924)** Acquired in 1925; 16,925 specimens
- Whitehouse HLK (1917-2000)** Acquired in 2001; c.6,000 specimens

1.3 *Sphagna* at NMW

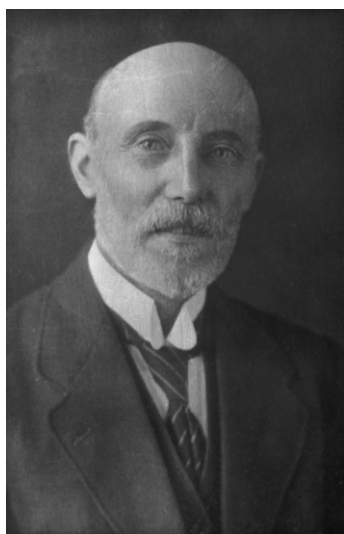
The number of bryophyte specimens within NMW and BBSUK collected from each vice-county (v.c.) (Appendix 1, page 26, lists the vice-counties) is show in

Figure 1 (page 8). Of the 18,000 *Sphagnum* specimens in NMW, the proportions of specimens collected from each region of the UK and Ireland is shown in Figure 2 (page 9); with Figure 3 (page 9) detailing the Welsh *Sphagnum* specimens.

The earliest *Sphagnum* specimen within the Herbarium was collected in 1820. Subsequently, there appears to have been very little bryophyte collection activity until 1896 when the Moss Exchange Club (which later became the British Bryological Society) was established. The number of *Sphagnum* specimens collected shows various peaks, with a decline between 1939-1945 during the Second World War, and a decline from the 1960's to the present (see Figure 4, page 10).

J.A. Wheldon © NMW

One year of particular note for collecting was 1901, with the collection of nearly 800 specimens. It is not known why NMW should hold so many specimens collected in 1901. In the Moss Exchange Club report of that year, it is noted that, 'The total number of specimens sent for distribution shows a considerable increase' and mentions *Sphagnum* specifically that a 'noteworthy feature is the large proportion of *Sphagna* received. We are indebted to Mr. Horrell for a number of fine examples of these plants; and also for a series of specimens collected by William Wilson' (MEC 1901, p68).



One of the main contributors to the early efforts of the MEC was J.A. Wheldon, who was an expert in *Sphagnum*. In 1917, Wheldon wrote 'A Synopsis of the European *Sphagna*, indicating the species, varieties and forms occurring in the British Isles, with descriptions of many of the forms' (Wheldon 1917). Following his death, NMW purchased his collection of 22,000 bryophytes in 1925 including his important *Sphagna* specimens. The inclusion of such collections makes NMW herbarium a key resource.

Many eminent bryologists have lived and/or collected in Wales. G.W. Garlick, for example, collected extensively in the area surrounding Bristol, and frequently crosses the border into southeast Wales, collecting prolifically in Monmouthshire. D.A. Jones collected many hundreds of specimens from Merionethshire (v.c. 48) and Caernarvonshire (v.c. 49), travelling from his home in Harlech. These two bryologists' collections are housed in NMW.

Figure 1: Number of bryophyte specimens collected from each vice-county in NMW & BBSUK

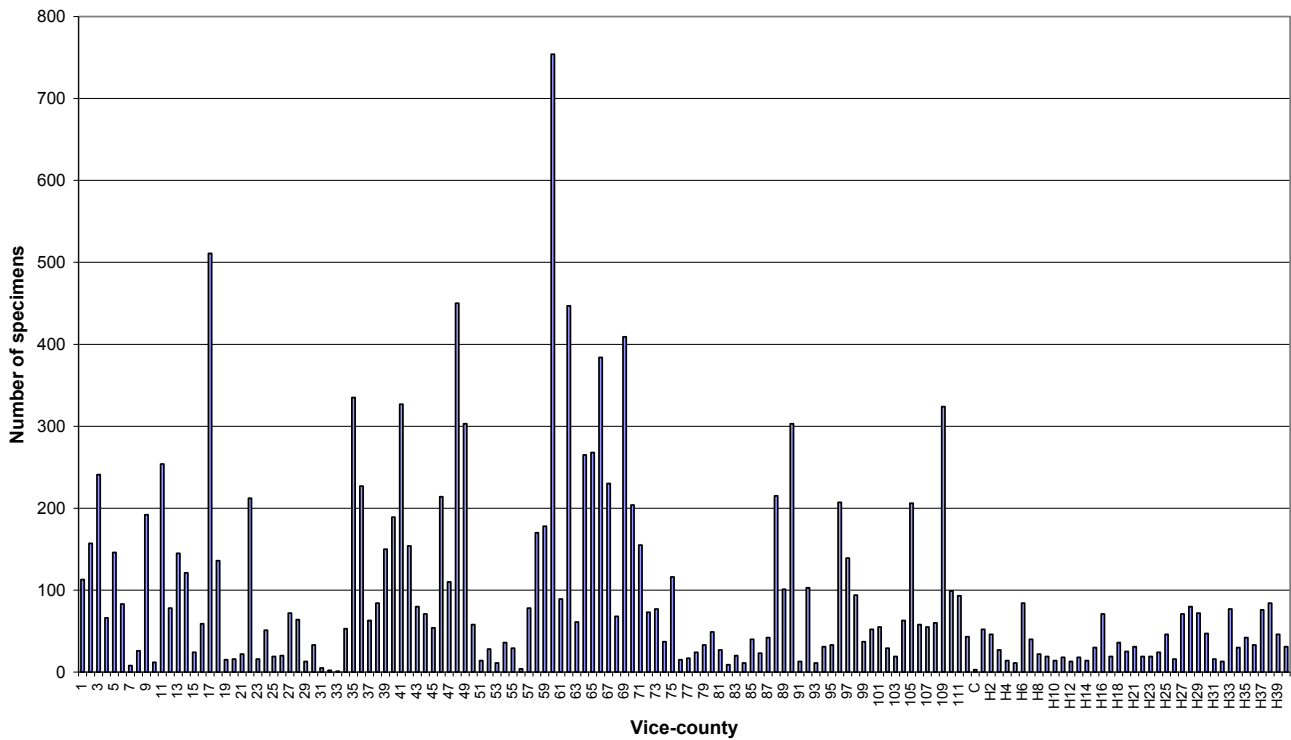


Figure 2 : Proportion of NMW & BBSUK *Sphagnum* specimens collected in each region of the UK and Ireland

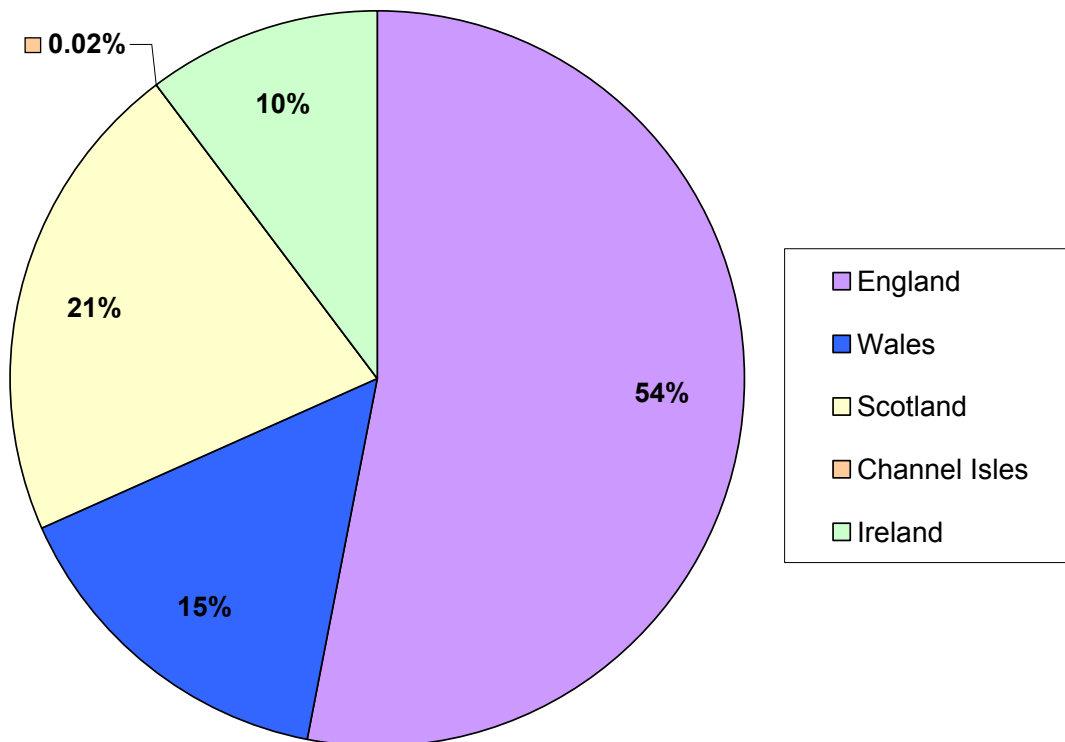


Figure 3 : Proportion of NMW & BBSUK *Sphagnum* specimens collected in each vice-county of Wales

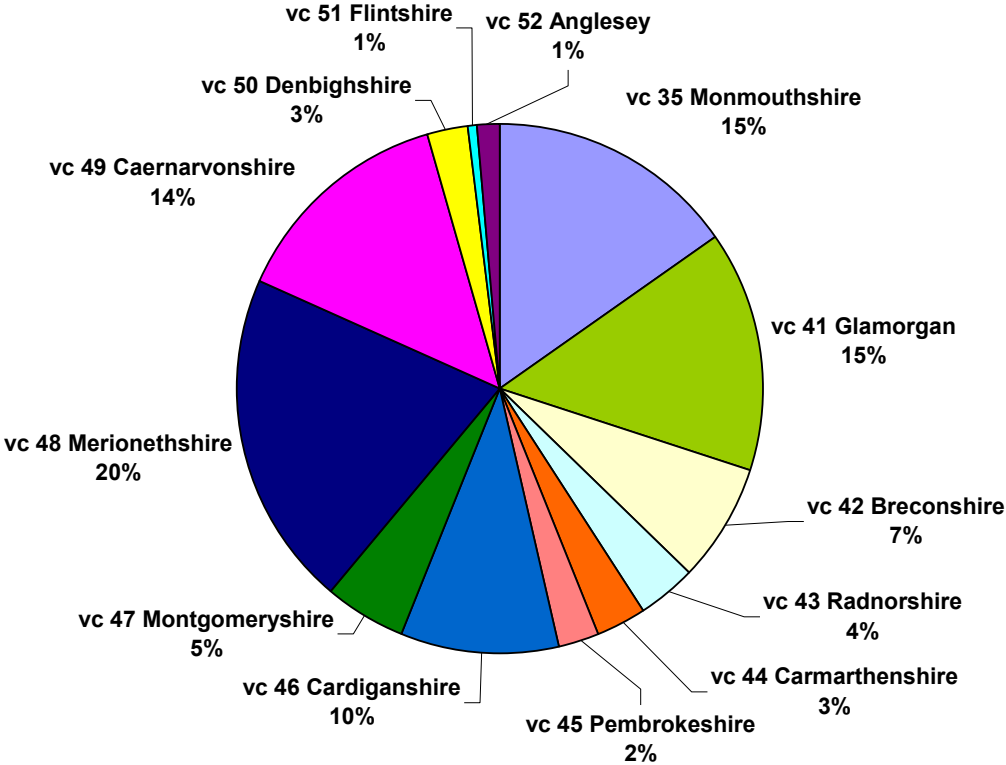
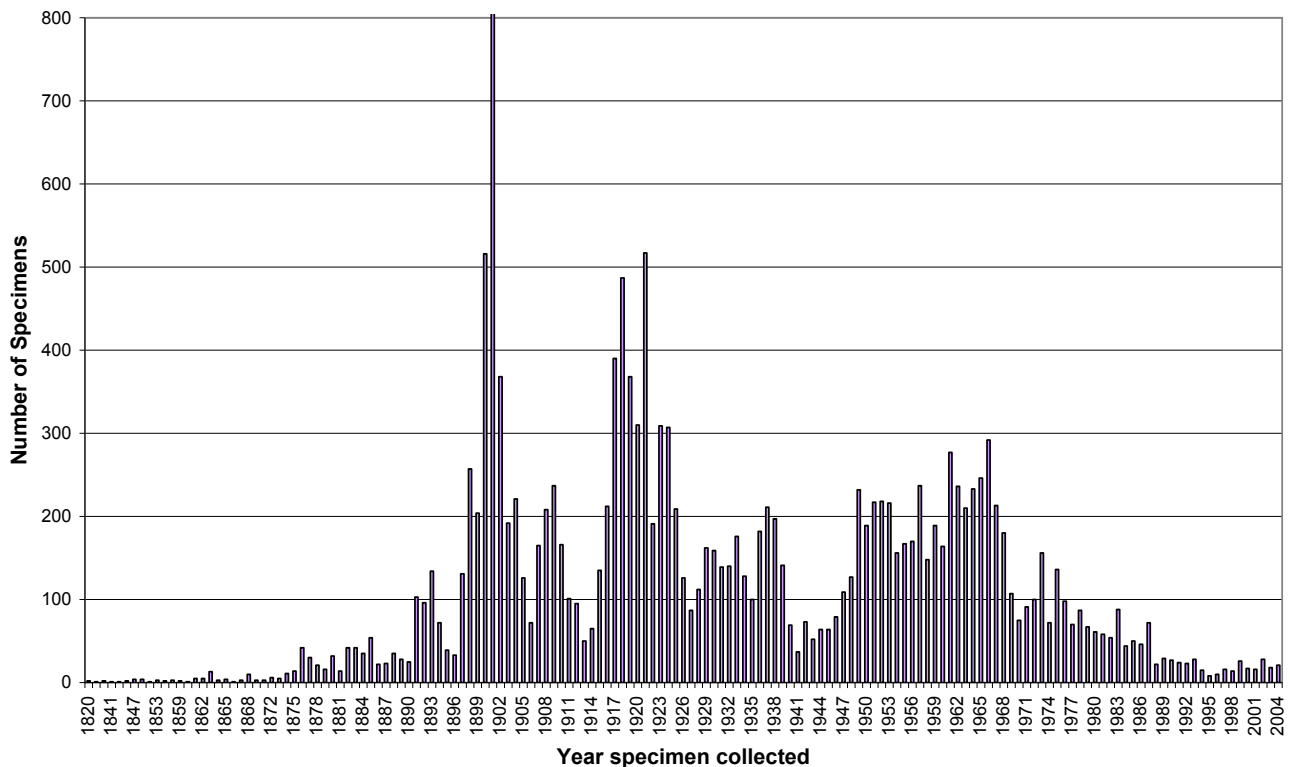


Figure 4 : Number of NMW & BBSUK *Sphagnum* specimens collected per year

1.4 *Sphagna* within Wales

It is not within the scope of this catalogue to describe the distribution of each *Sphagnum* species in the UK, this is described elsewhere (Hill *et al.* 1991, 1992 & 1994). However, a brief overview of Welsh *Sphagna* is important.

Wales is a very important area for *Sphagnum* due to the habitats that occur within its borders, particularly the Oceanic northern and western parts of the country. Oceanic areas in Britain have high rainfall and relatively mild winters. This creates habitats such as raised bogs, which are of international importance. Active raised bogs are bogs that are still producing peat and support a high species diversity.

Cors Caron (Tregaron Bog), Cardiganshire (v.c. 46) is the most intact surviving example in the UK of a raised bog landscape (JNCC 2009a) and the largest raised bog in Wales. It is designated as a Ramsar site, (a wetland of international importance) and a Special Area of Conservation (SAC).

In the past, Cors Caron has supported *Sphagnum balticum*, a British Red Data List species. However, this has not been seen in this locality since 1967 (UK Biodiversity Group 1999). The Herbarium holds a specimen of *S. balticum* collected in 1967, with many other *Sphagna* from Cors Caron.

Cors Fochno (Borth Bog), Merionethshire (v.c. 48) is another active raised bog that has also been designated both Ramsar and SAC site status. This forms the largest expanse of primary near-natural raised bog in an estuarine context within the UK. This type of bog maintains species such as *Sphagnum fuscum*, *S. imbricatum* ssp. *austinii* and *S. pulchrum* (JNCC 2009b).

Another British Red Data List species from lowland raised bog habitats, has recently been found in Wales. *Sphagnum skyense* is listed as data deficient and was found in 2004 by S.D.S. Bosanquet near Aberystwyth in Cardiganshire (v.c. 46). Previously, this species had only been known from the Isle of Skye (v.c. 104), the Outer Hebrides (v.c. 110) in Scotland and Waterford (v.c. H6) in Ireland.

Other wetland sites significant for *Sphagnum* populations in Wales include bogs at Cwm Mawr above Harlech (v.c. 48, Merionethshire), Trelleck Bog in Monmouthshire (v.c. 35) and the Anglesey & Llŷn Fens (v.c. 49, Caernarvonshire and v.c. 52, Anglesey). These bog and fen areas within Wales are rich in *Sphagnum* species and are well represented in NMW.

2.0 Compilation of the Catalogue

2.1 Documentation

This catalogue is the result of data entry over more than a decade. Data were extracted directly from herbarium packets and sheets, and entered onto the National Museum Wales' computerised Collections Management System (CMS). This hierarchical, relational database was installed by NMW in 1997 and was specifically designed by Micromusée to document museum collections.

Inaccuracies and inconsistencies are inevitable when processing such a large dataset. While every effort has been made to eliminate these, it is likely that some remain. The authors would appreciate any feedback on such errors.

All *Sphagna* held in NMW on 22/8/2006 were included in this catalogue. However, grid references and precise localities for rare or endangered species are omitted from this catalogue. Wherever practical, national Red Data Lists have been consulted to determine the status of rare species by country (BBS 2005, Church *et al.* 2004, Hallingbäck 2002, Kålås 2006, Lilleleht 1998, Preston 2006, Rassi *et al.* 2001, Schnyder *et al.* 2004, Siebel *et al.* 2005 and Siebel *et al.* 2006) in conjunction with the international IUCN Red List of bryophytes (Hallingbäck 2000) and European Red List (ECCB 1995).

Nationally Red Listed *Sphagnum* species

[Only those taxa held by NMW are listed.]

1. *Sphagnum affine* **Europe** (ECCB 1995) **Finland** Vulnerable (Rassi *et al.* 2001); **UK** Nationally Scarce (Preston 2006)
2. *Sphagnum angustifolium* **UK** Nationally Scarce (Preston 2006)
3. *Sphagnum aongstroemii* **Estonia** Extinct or probably extinct (Lilleleht 1998)
4. *Sphagnum austinii* **Europe** (ECCB 1995); **UK** Nationally Scarce (Preston 2006)
5. *Sphagnum balticum* **UK** Nationally Rare (Preston 2006)
6. *Sphagnum palustre* var. *centrale* **Europe** (ECCB 1995)
7. *Sphagnum contortum* **Finland** Near Threatened. (Rassi *et al.* 2001)
8. *Sphagnum flexuosum* **UK** Nationally Scarce (Preston 2006)
9. *Sphagnum inundatum* **Finland** Near Threatened (Rassi *et al.* 2001)
10. *Sphagnum jensenii* **Estonia** Indeterminate (Lilleleht 1998 and Ingelög *et al.* 1993)
11. *Sphagnum lindbergii* **Estonia** Rare (Lilleleht 1998 and Ingelög *et al.* 1993); **UK** Nationally Scarce (Preston 2006)
12. *Sphagnum magellanicum* **Europe** (ECCB 1995)
13. *Sphagnum majus* **UK** Nationally Rare (Preston 2006)

14. *Sphagnum molle* **Finland** Rare (Lilleleht 1998 and Ingelög *et al.* 1993); **Estonia** Rare (Lilleleht 1998 and Ingelög *et al.* 1993)
15. *Sphagnum obtusum* **UK** Extinct [The last NMW specimen was collected in 1926]. (Preston 2006)
16. *Sphagnum palustre* **Europe** (ECCB 1995)
17. *Sphagnum papillosum* **Europe** (ECCB 1995)
18. *Sphagnum platyphyllum* **UK** Nationally Scarce (Preston 2006)
19. *Sphagnum pulchrum* **UK** Nationally Scarce (Preston 2006)
20. *Sphagnum pylaisii* **Europe** (ECCB 1995)
21. *Sphagnum quinquefarium* **Estonia** Indeterminate (Lilleleht 1998 and Ingelög *et al.* 1993)
22. *Sphagnum riparium* **UK** Nationally Rare (Preston 2006)
23. *Sphagnum skyense* **UK** Nationally Rare (Preston 2006)
24. *Sphagnum subfulvum* **Estonia** Indeterminate (Lilleleht 1998 and Ingelög *et al.* 1993)
25. *Sphagnum subnitens* **Finland** Near Threatened (Rassi *et al.* 2001)
26. *Sphagnum subsecundum* **UK** Nationally Scarce (Preston 2006)
27. *Sphagnum wulfianum* **Norway** Endangered (Kålås *et al.* 2006)



2.2 *Sphagnum* Nomenclature

During the compilation of this catalogue, for some older specimens lacking recent identifications, several texts were consulted such as Daniels & Eddy (1980) and Smith (1978). Specimens are placed under their most recent determination. Nomenclature follows, as far as possible, the current BBS Checklist and Census Catalogue (Hill *et al.* 2008) and, wherever relevant, Smith (2004). Authority abbreviations for all plant names follow Brummitt & Powell (1992).

Allopolyploidy has been found to contribute to *Sphagnum* evolution. This causes difficulty in taxonomic delimitation resulting in many species complexes (Greilhuber *et al.* 2003). Although a comprehensive taxonomic revision is not within the scope of this work, the following synopsis outlines the nomenclature followed. The synonyms listed are not exhaustive.

2.3 Species Synopsis

Listed below are the species included in this catalogue with any synonyms that were encountered when compiling the list. A full alphabetical list of accepted and synonymous *Sphagnum* names used in this catalogue are listed in Appendix 3.

***Sphagnum acutum* Warnst. var. *hakusanense* Warnst.:** No synonyms

***Sphagnum affine* Ren.& Card.**

Synonyms: *S. turfaceum* Warnst.; *S. imbricatum* ssp. *affine* Ren.& Card.

Sphagnum angermanicum Melin : No synonyms

Sphagnum angustifolium (C.Jens. ex Russ.) C.Jens.

Synonyms : *S. amblyphyllum* (Russ.) Warnst. var. *parvifolium* Warnst. ; *S. amblyphyllum* var. *tenue* Warnst.; *S. flexuosum* Dozy & Molk. var. *tenue* M.O.Hill ex A.J.E.Smith; *S. parvifolium* Warnst.; *S. parvifolium* var. *tenue* (Klinggr.) Warnst.; *S. recurvum* P.Beauv. var. *parvifolium* Warnst.; *S. recurvum* ssp. *angustifolium* (C.Jens.) Russ.; *S. recurvum* var. *tenue* Klinggr.

Sphagnum capillifolium © NMW,

Whitehouse collection

Sphagnum annulatum Lindb.f. ex Warnst.

Synonym : *S. annulatum* var. *tereti-ramosum* Warnst.

Sphagnum aongstroemii C.Hartm.

Synonym : *S. insulosum* Ängstr.

Sphagnum austinii Sull. ex Aust.

Synonyms : *S. austinii* var. *imbricatum* (Hornsch. ex Russow) Lindb.; *S. imbricatum* Hornsch. ex Russ. ssp. *austinii* (Sull.) Flatberg

Sphagnum australe Mitt. : No synonyms



Sphagnum balticum (Russ.) Russ. ex C.Jens.

Synonym : *S. cuspidatum* Ehrh. ex Hoffm. var. *brevifolium* Lindb.

Sphagnum beccarii Hamp. : No synonyms

Sphagnum capillifolium (Ehrh.) Hedw. s.l.

There have been at least four microspecies previously described in Britain and Ireland (Smith 2004). The two subspecies commonly recognised are *S. capillifolium* ssp. *capillifolium* and *S. capillifolium* ssp. *rubellum*. These subspecies intergrade but are kept separate in this catalogue following the Checklist and Census Catalogue of British and Irish Bryophytes (Hill *et al.* 2008).

Synonyms : *S. acutifolium* Ehrh. ex Schrad.; *S. acutifolium* var. *deflexum* Schimp.; *S. acutifolium* var. *elegans* Braithw.; *S. acutifolium* var. *flavescens* Warnst.; *S. acutifolium* var. *flavo-rubellum* Warnst.; *S. acutifolium* var. *griseum* Warnst.; *S. acutifolium* var. *obscurum* Warnst.; *S. acutifolium* var. *pallescens* Warnst.; *S. acutifolium* var. *purpurascens* Warnst.; *S. acutifolium* var. *pusillum* Röhl; *S. acutifolium* var. *roseum* Warnst.; *S. acutifolium* var. *rubrum* Brid. ex. Warnst.; *S. acutifolium* var. *versicolor* Warnst.; *S. acutifolium* var. *viride* Warnst.; *S. antillarum* Schimp.; *S. capillaceum* (Weiss) Schrank; *S. nemoreum* Scop.; *S. parvulum* Warnst. var. *flavescens* Warnst.; *S. schimperi* (Warnst.) Röhl var. *densum* Röhl; *S. tenerum* (Aust.) Warnst. including infra-specific taxa

Sphagnum capillifolium (Ehrh.) Hedw. ssp. rubellum (Wils.) M.O.Hill

Synonym : *S. acutifolium* var. *arctum* Braithw.; *S. acutifolium* var. *leptocladum* Limpr.; *S. acutifolium* var. *rubellum* Wils.; *S. andersonianum* Andrus.; *S. capillaceum* (Weiss) Schrank var. *tenellum* (Schimp.) Andrus.; *S. rubellum* Wils. including infra-specific taxa; *S. subtile* (Russ.) Warnst.; *S. tenellum* (Brid.) Pers. ex Brid. var. *rubellum* (Wils.) Warnst.

Sphagnum capillifolium (Ehrh.) Hedw. var. tenerum (Sull.& Lesq. Ex Sull.) Crum.

Synonyms : *S. tenerum* Sull.& Lesq.

Sphagnum carolinianum Andr. : No synonyms

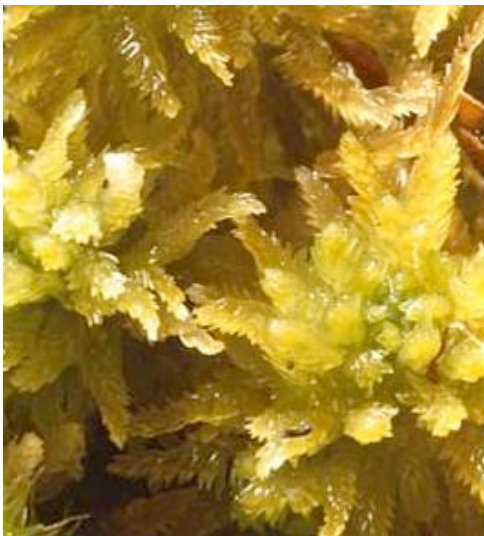
Sphagnum contortum © NMW,

Sphagnum compactum Lam. & DC.

Synonyms : infra-specific taxa of *S. compactum*; *S. rigidum* (Nees & Hornsch.) Schimp.; *S. rigidum* var. *compactum* Lam. & DC.; *S. rigidum* var. *squarrosum* Russ.; *S. rigidum* var. *subsquarrosum* Warnst.

Sphagnum contortum K.F.Schultz

Synonyms : *S. artariae* Warnst.; *S. contortum* including infra-specific taxa (except var. *obesum* Wils., var.



teretiusculum Röll and var. *warnstorffii* Roll. which are synonyms of *S. denticulatum* Brid.); *S. curvifolium* Wils.; *S. laricinum* (Wils.) Spruce ex Ångstr. including infra-specific taxa; *S. subsecundum* Nees var. *contortum* (Schultz) Hüb.; *S. subsecundum* var. *mesophyllum* Warnst.

Sphagnum cristatum Hamp.

Synonyms : *S. otagense* Warnst.; *S. wardellense* Warnst.

Sphagnum cuspidatum Ehrh. ex Hoffm.

Synonyms : *S. aquaticum* Warnst. var. *turgidum* Warnst.; *S. cuspidatum* including infra-specific taxa (not including var. *serrulatum* (Schleiph.) Schleiph.); *S. serratum* Aust. var. *serrulatum* Warnst.; *S. trinitense* C.Müll. var. *lorifolium* Roth.; *S. viride* Flatberg

Sphagnum cuspidatum Ehrh. ex Hoffm. var. serrulatum (Schleiph.) Schleiph.

Synonym : *S. cuspidatum* var. *serratum* (Aust.) Lesq. et. James.

Sphagnum cyclophyllum Sull. & Lesq.

Synonym : *S. microcarpum* Warnst.

Sphagnum davidii Warnst. var. flavofuscescens Warnst.

No synonyms

Sphagnum denticulatum Brid.

Note that *S. denticulatum* var. *inundatum* (Russow) Kartt. is a synonym of *S. inundatum* Russ. (Hill *et al.* 2008).

Synonyms : *S. aquatile* Warnst. including infra-specific taxa; *S. armoricum* Warnst.; *S. auriculatum* Schimp. including infra-specific taxa; *S. bavaricum* Warnst.; *S. bavaricum* Warnst. var. *mesophyllum* Warnst.; *S. bavaricum* Warnst. var. *microphyllum* Warnst.; *S. camusii* (Card.) Warnst.; *S. camusii* var. *plumosum* Warnst.; *S. camusii* var. *venustum* Warnst.; *S. contortum* Schulz. var. *obesum* Wils.; *S. contortum* K.F.Schultz var. *teretiusculum* Röll; *S. contortum* var. *warnstorffii* Roll.; *S. crassicladum* Warnst. including infra-specific taxa; *S. denticulatum* var. *plumosum* Warnst.; *S. franconiae* Warnst. including infra-specific taxa; *S. gravetii* Russ.; *S. gravetii* Warnst.; *S. holtii* Warnst.; *S. lescurii* Sull.; *S. obesum* (Wils.) Warnst. including infra-specific taxa; *S. rufescens* Limpr. including infra-specific taxa.

Sphagnum erythrocalyx Hamp.

Synonyms : *S. ludovicianum* (Ren.& Card.) Warnst.; *S. perichaetiale* Hampe

Sphagnum falcatum Bresch.

Synonyms : *S. drepanocladum* Warnst.; *S. falcatum* Bresch. var. *microporum* Warnst.; *S. trichophyllum* Warnst. var. *novozelandica*

Sphagnum fallax (Klinggr.) Klinggr.

Sphagnum fallax ssp. *isoviitae* (Flatberg) M.O.Hill is synonymised under *S. fallax*. *S. fallax* s.l. has previously been described as being three separate species; *S. fallax* s.s., *S. isoviitae* and *S. brevifolium* (Flatberg 1992) but now these are all thought to be one variable species (Sastad SM *et al.*, 1999, Smith 2004 and Hill *et al.* 2008).

Synonyms : *S. apiculatum* Lindb.; *S. brevifolium* (Lindb. ex Braithw.) Röll emend. Flatberg, *S. fallax* including infra-specific taxa; *S. flexuosum* Dozy & Molk. var. *fallax* (Klinggr.) M.O.Hill ex. A.J.E.Smith; *S. isoviitae* Flatberg, *S. recurvum* P.Beauv. var. *mucronatum* (Russ.) Warnst.; *S. recurvum* var. *parvulum* Warnst.

Sphagnum fimbriatum Wils.

Synonyms : infra-specific taxa of *S. fimbriatum*

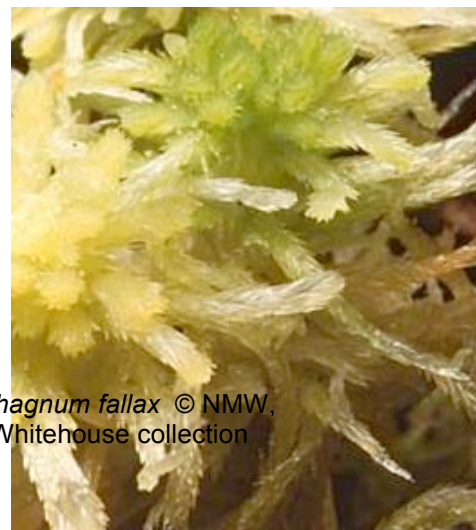
Sphagnum fitzgeraldii Ren.& Card. : No synonyms

Sphagnum flavicomans (Card.) Warnst.

Synonym : *S. subnitens* Russ. & Warnst. var. *flavicomans* Card.

Sphagnum flexuosum Dozy & Molk.

Synonyms : *S. amblyphyllum* (Russ.) Warnst.; *S. amblyphyllum* var. *macrophyllum* Warnst.; *S. amblyphyllum* var. *mesophyllum* Warnst.; *S. intermedium* Hoffm.; *S. intermedium* var. *amblyphyllum*; *S. intermedium* var. *majus* C.E.O. Jensen; *S. recurvum* var. *amblyphyllum* (Russ) Warnst.; *S. recurvum* var. *majus* (Ängstr. ex Warnst.) Warnst.; *S. recurvum* var. *robustum* Breidl.; *S. recurvum* var. *sylvaticum* Russ.; *S. riparioides* Warnst.



Sphagnum fallax © NMW, Whitehouse collection

Sphagnum fuscum (Schimp.) Klinggr.

Synonyms : *S. acutifolium* Ehrh. ex Schrad. var. *fuscum* Schimp.; infra-specific taxa of *S. fuscum*

Sphagnum girgensohnii Russ.

Synonyms : infra-specific taxa of *S. girgensohnii*; *S. strictum* Lindb.

Sphagnum guwassanense Warnst. : No synonyms

Sphagnum guwassanense Warnst. var. takedae (Okam.) Suzuki : No synonyms

Sphagnum hamiltoni Dix. : No synonyms

Sphagnum henryense Warnst. : No synonyms

Sphagnum imbricatum Hornsch. ex Russ.

Synonyms : *S. carlottae* Andrus.; *S. imbricatum* var. *crisatum* Warnst.; *S. imbricatum* var. *sublaeve* Limpr. ex Warnst.

Sphagnum inundatum Russ.

Treated as a species in this catalogue as per Hill *et al.* (2008), although there is debate (Smith 2004) as to whether *S. inundatum* should be a subspecies of *S. subsecundum* or *S. denticulatum*.

Synonyms : *S. auriculatum* Schimp. var. *inundatum* (Russ.) M.O.Hill; *S. denticulatum* var. *inundatum* (Russow.) Kartt.; *S. hercynicum* Warnst.; *S. hercynicum* var. *binsteadii* Wheld.; infra-specific taxa of *S. inundatum*; *S. orlandense* Warnst.; *S. subsecundum* ssp. *inundatum* (Russ.) C.Jens.

Sphagnum jensenii Lindb.

Synonym : *S. annulatum* H. Lindb. ex Warnst. var. *porosum* (Schlieph.& Warnst.) Maass & Isov.

Sphagnum junghuhnianum Dozy & Molk. : No synonyms

Sphagnum khasianum Mitt. : No synonyms

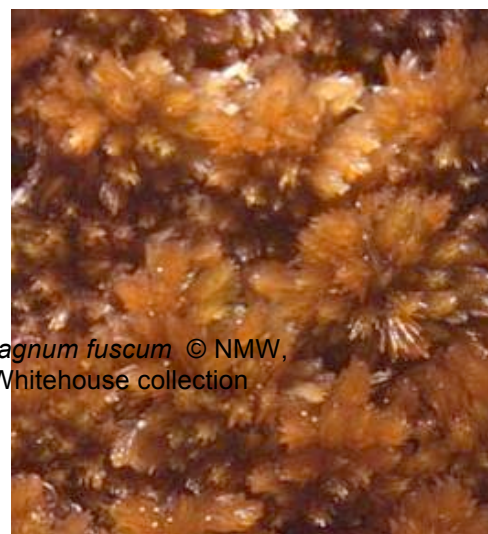
Sphagnum kushiroense Suzuki. : No synonyms

Sphagnum lenense Lindb. : No synonyms

Sphagnum lindbergii Schimp. ex Lindb.

Synonyms : infra-specific taxa of *S. lindbergii*

Sphagnum luzonense Warnst. : No synonyms



Sphagnum fuscum © NMW, Whitehouse collection

Sphagnum macrophyllum Bernh. ex Brid. : No synonyms

Sphagnum macrophyllum Bernh. ex Brid. var. floridanum Aust. : No synonyms

Sphagnum magellanicum Brid.

Synonyms : *S. cymbifolium* Ehrh. var. *congestum* Schimp.; *S. cymbifolium* Ehrh. var. *purpurascens* Russ.; infra-specific taxa of *S. magellanicum*; *S. medium* Lindb. including infra-specific taxa

Sphagnum majus (Russ.) C.Jens.

Synonyms : *S. majus* ssp. *norvegicum* Flatberg; *S. cuspidatum* Ehrh. ex Hoffm. var. *majus* Russ.; *S. dusenii* C.Jens. & W.Warnst. including infra-specific taxa
Sphagnum, mosses & liverworts
Whitehouse collection

Sphagnum mendocinum Sull. & Lesq. : No synonyms

Sphagnum meridense (Hamp.) C.Müll. : No synonyms

Sphagnum microporum Warnst.

Synonym : *S. okamurae* Warnst.



Sphagnum molle Sull.

Synonyms : infra-specific taxa of *S. molle*; *S. muelleri* Schimp.

Sphagnum novo-zelandicum Mitt. : No synonyms

Sphagnum obtusum Warnst.

Synonyms : infra-specific taxa of *S. obtusum*; *S. recurvum* var. *riparioides* Warnst.; *S. zickendrathii* Warnst.

Sphagnum palustre L.

Synonyms : *S. cymbifolium* (Ehrh.) Hedw. including infra-specific taxa (except var. *congestum* Schimp. and var. *purpurascens* Russ. which are synonyms of *S. magellanicum* Brid.); *S. derrumbense* Warnst.; *S. intermedium* Russ.; *S. heterophyllum* Warnst.; *S. klinggraeffii* Röhl var. *brachycladum* Röhl; *S. klinggraeffii* var. *pycnocladum* Röhl.; *S. palustre* L. var. *laxum* Warnst.; *S. plumulosum* Röhl var. *flavo-fuscescens* Warnst.

Sphagnum palustre var. centrale (C.Jens.) A.Eddy

This is an uncommon variety in Britain (Smith 2004, Hill *et al.* 2008), which is raised to species level in Europe and America.

Synonyms : *S. centrale* C.Jens.; *S. centrale* var. *glaucescens* Warnst.; *S. papillosum* Lindb. var. *intermedium* (Russ.) Warnst.; *S. subbicolor* Hamp. including infra-specific taxa

Sphagnum papillosum Lindb.

Synonyms : *S. hakkodense* Warnst. & Card.; *S. hakkodense* var. *condensum*; infra-specific taxa of *S. papillosum*

Sphagnum planifolium C. Müll. : No synonyms

Sphagnum platyphyllum (Lindb. ex Braithw.) Sull.

Synonyms : *S. laricinum* (Wils.) Spruce ex. Lindb. var. *platyphyllum* Lindb.; *S. laricinum* (Wils.) Spruce ex Ängstr. var. *teretiusculum* Lindb.; *S. neglectum* Ängstr.; infra-specific taxa of *S. platyphyllum* (Lindb.) Warnst.; *S. subsecundum* Nees var. *robustum* Warnst.

Sphagnum riparium © NMW,

Whitehouse collection

Sphagnum portoricense Hamp. : No synonyms

Sphagnum pulchrum (Lindb. ex Braithw.) Warnst.

Synonyms : *S. intermedium* Hoffm. var. *pulchrum* Lindb. in Braithw.; infra-specific taxa of *S. pulchrum*; *S. recurvum* P.Beauv. var. *pulchrum* Lindb.

Sphagnum pylaesii Brid.

Synonyms : *S. pylaiei* var. *ramosum* Warnst.; *S. pylaiei* Braithw.

Sphagnum pylaesii Brid. var. sedoides (Brid.) Lindb.

Synonym : *S. sedoides* Brid.



Sphagnum quinquefarium (Lindb. ex Braithw.) Warnst.

Synonyms : *S. acutifolium* Ehrh. var. *quinquefarium* Lindb.; *S. bartlettianum* Warnst.; infra-specific taxa of *S. quinquefarium*

Sphagnum recurvum P.Beauv. agg.

S. recurvum s.s. does not occur in Britain. Specimens from Britain originally identified as *S. recurvum*, are now placed in one of three species in this aggregate; *S. fallax*, *S. flexuosum* or *S. angustifolium* following Smith (2004).

Sphagnum riparium Ängstr.

Synonyms : *S. intermedium* var. *riparium* Lindb.; infra-specific taxa of *S. riparium*

Sphagnum russowii Warnst.

Synonyms : *S. acutifolium* Ehrh. ex. Schrad. var. *lilacinum* Spruce; *S. acutifolium* var. *patulum* Schimp.; *S. acutifolium* var. *robustum* Russ.; *S. robustum* (Russ.) Röhl; *S. robustum* (Warnst.) Röhl; *S. robustum* (Warnst.) Card. including infra-specific taxa; infra-specific taxa of *S. russowii* Warnst.

Sphagnum sericeum C.Müll. : No synonyms

Sphagnum skyense Flatberg : No synonyms

Flatberg considered it might be a hybrid of *S. quinquefarium* and *S. subnitens*. Daniels and Eddy (1990) consider *S. skyense* and *S. junghuhnianum* conspecific. Due to lack of consensus, these species are kept separate in this catalogue.

Sphagnum sparsum Hampe : No synonyms

Sphagnum squarrosum Crome

Synonyms : infra-specific taxa of *S. squarrosum*

Sphagnum strictum Sull.

Synonyms : *S. garberi* Lesq. & James.; *S. mexicanum* var. *ecuadorensis* Warnst.; *S. strictum* var. *gracilesens*; *S. strictum* var. *subsquarrosum* Warnst.

Sphagnum strictum Sull. ssp. pappeanum (C.Müll.)

A.Eddy : No synonyms

Sphagnum subfulvum Sjörs

S. subfulvum s.s. was found not to occur in Britain or Ireland (Smith 1978, Corley & Hill 1981, Flatberg 1985, Blockeel 1998, Smith 2004). Consequently, any specimens collected in Britain and Ireland are placed under *S. subnitens* (Flatberg 1985 and Smith 2004). Specimens determined as *S. subfulvum* collected from outside of Britain are filed as *S. subfulvum* despite this latter species not being well defined (Smith 2004).

Sphagnum subnitens Russ. & Warnst.

Synonyms : *S. acutifolium* Ehrh. var. *laetevirens* Braithw.; *S. acutifolium* Ehrh. ex Schrad. var. *luridum* Hüb.; *S. acutifolium* Ehrh. var. *purpureum* Schimp.; *S. acutifolium* var. *subnitens* Dix.; *S. plumulosum* Röhl including infra-specific taxa; *S. quinquefarium* (Lindb. ex Braithw.) Warnst. var. *brachycladum* (Röhl) Röhl; *S. subnitens* Russ. & Warnst. including infra-specific taxa

Sphagnum subnitens Russ. & Warnst. var. ferrugineum (Flatberg) M.O.Hill

S. subnitens var. *ferrugineum* has been retained as a variety following Blockeel & Long (1998) and Hill *et al.* (2008). Smith (2004) does not recognise the variety, and places it under *S. subnitens*.

Synonyms : *S. subnitens* spp. *ferrugineum* Flatberg

Sphagnum subobesum Warnst. : No synonyms

Sphagnum subrecurvum Warnst. : No synonyms

Sphagnum subsecundum Nees



Sphagnum squarrosum © NMW, Whitehouse collection

Synonyms : *S. pseudo-rufescens* Warnst.; *S. submolliculum* Warnst. var. *validum* Warnst.; infra-specific taxa of *S. subsecundum*



Sphagnum teres © NMW,
Whitehouse collection

***Sphagnum tenellum* (Brid.) Pers. ex Brid.**

Synonyms : *S. molluscum* Bruch including infra-specific taxa; infra-specific taxa of *S. tenellum*

***Sphagnum teres* (Schimp.) Ångstr.**

Synonyms : infra-specific taxa of *S. teres*

***Sphagnum torreyanum* Sull.**

Synonyms : *S. cuspidatum* Ehrh. ex Hoffm. var. *miquelonense* (Ren.& Card. e.p.) Warnst.; *S. cuspidatum* var. *torreyanum* (Sulliv.) Lesq.& James.

***Sphagnum tumidulum* Besch. : No synonyms**

***Sphagnum warnstorffii* Russ.**

Synonyms : *S. acutifolium* Ehrh. var. *intermedium* Wils.; infra-specific taxa of *S. warnstorffii*

***Sphagnum wulfianum* Girg.**

Synonyms : infra-specific taxa of *S. wulfianum*

2.4 Classification of Taxa held at NMW

The classification below follows Smith (2004) for British species; non-British species were placed using Corley (1981), Crum (1984), Crum (1981), Eddy (1988), Eddy (1985), Eddy (1977), Fife (1996) and Nebel & Philippi (2005).

A large molecular study of *Sphagnum* has been undertaken by Shaw (2000). The work of Shaw (2000) largely supported the main divisions but suggested that sections *Squarrosa*, *Insulosa* and *Polyclada* be nested within section *Acutifolia*; section *Isocladus* be nested within section *Subsecunda* and *Hemitheca* be nested within section *Cuspidata*.

Classification

Section *Sphagnum*

- S. austinii* Sull. ex Aust.
- S. imbricatum* Hornsch. ex Russ. (Nebel & Philippi 2005, Crum 1981)
- S. affine* Ren.& Card.
- S. papillosum* Lindb.
- S. palustre* L.
- S. magellanicum* Brid.
- S. henryense* Warnst. (Crum 1981)
- S. portoricense* Hamp. (Crum 1981)

- S. cristatum* Hamp. (Fife 1996)
- S. beccarii* Hamp. (synonym of *S. perichaetiale* (Crum 1984))
- S. erythrocalyx* Hamp. (Crum 1984)

Section *Squarrosa*

- S. squarrosus* Crome.
- S. teres* (Schimp.) Ångstr.

Section *Acutifolia*

- S. fimbriatum* Wils.
- S. girgensohnii* Russ.
- S. russowii* Warnst.
- S. quinquefarium* (Lindb. ex Braithw.) Warnst.
- S. warnstorffii* Russ.
- S. capillifolium* (Ehrh.) Hedw.
- S. fuscum* (Schimp.) Klinggr.
- S. subnitens* Russ. & Warnst.
- S. skyense* Flatberg
- S. junghuhnianum* Dozy & Molk. (Eddy 1988)
- S. molle* Sull.
- S. angermanicum* Melin (Crum 1981, Daniels & Eddy 1990)
- S. flavicomans* (Card.) Warnst. (Crum 1981)
- S. subfulvum* Sjörs (Daniels & Eddy 1990, Crum 1984)
- S. meridense* (Hamp.) C.Müll. (Crum 1984)
- S. sparsum* Hampe (Crum 1984)

Section *Insulosa*

- S. aongstroemii* C.Hartm. (Crum 1981, Daniels & Eddy 1990)

Section *Polyclada*

- S. wulfianum* Girg. (Crum 1981, Crum 1984, Daniels & Eddy 1990)

Section *Rigida*

- S. strictum* Sull.
- S. strictum* ssp. *pappeanum* (C.Müll.) A.Eddy (Eddy 1988)
- S. compactum* Lam. & DC.
- S. sericeum* C.Müll. (Eddy 1988)
- S. australe* Mitt. (Fife 1996)

Section *Subsecunda*

- S. subsecundum* Nees
- S. inundatum* Russ.
- S. denticulatum* Brid.
- S. contortum* K.F.Schultz
- S. platyphyllum* (Lindb. ex Braithw.) Sull.
- S. luzonense* Warnst. (Eddy 1988)
- S. cyclophyllum* Sull. & Lesq. (Crum 1981, Crum 1984)
- S. novo-zelandicum* Mitt. (Fife 1996)
- S. carolinianum* Andr. (syn of *S. subsecundum* var. *carolinianum* (R.E. Andrus) H.A. Crum (Crum 1984))
- S. guwassanense* Warnst. (Crum 1984)
- S. subobesum* Warnst. (syn of *S. subsecundum* var. *junsaiense* (Crum 1984))
- S. khasianum* Mitt. (syn of *S. subsecundum* var. *khasianum* (Shaw 2000))
- S. davidii* var. *flavofuscescens* Warnst. (Shaw 2000)

Section *Isocladus*

- S. macrophyllum* Bernh. ex Brid. (Crum 1981)

Section *Cuspidata*

- S. tenellum* (Brid.) Pers.ex Brid.
- S. cuspidatum* Ehrh. ex Hoffm.
- S. majus* (Russ.) C.Jens.
- S. balticum* (Russ.) Russ.ex C.Jens.
- S. pulchrum* (Lindb. ex Braithw.) Warnst.
- S. fallax* (Klinggr.) Klinggr.
- S. angustifolium* (C.Jens.ex Russ.) C.Jens.
- S. flexuosum* Dozy & Molk.
- S. obtusum* Warnst.
- S. riparium* Ångstr.
- S. lindbergii* Schimp. ex Lindb.
- S. fitzgeraldii* Ren.& Card. (Crum 1981)
- S. torreyanum* Sull. (Crum 1981)
- S. annulatum* Lindb.f. ex Warnst. (Crum 1981)
- S. falcatum* Bresch. (Fife 1996)
- S. lenense* Lindb. (Daniels & Eddy 1990, Crum 1984)
- S. jensenii* Lindb. (Daniels & Eddy 1990)
- S. mendocinum* Sull.& Lesq. (Crum 1984)

Section *Hemitheca*

- S. pylaesii* var. *sedoides* (Brid.) Lindb. (Crum 1981, Crum 1984, Daniels & Eddy 1990)

Unplaceable species:

- S. kushiroense* H.Suzuki. (insufficiently known (Crosby 1999))
- S. microporum* Warnst. ex Cardot (insufficiently known (Crosby 1999))
- S. hamiltoni* Dix. (no references found)

Unplaced species: (no references found)

- S. acutum* Warnst. var. *hakusanense* Warnst. (Iwatsuki 1991)
- S. cuspidatum* Müll. Hal. (Eddy 1977)
- S. planifolium* C. Müll. (Eddy 1985)
- S. subrecurvum* Warnst. (Eddy 1977)
- S. tumidulum* Besch. (Eddy 1985)

2.5 Use of the Catalogue

The catalogue is presented in two excel files, *Sphagnum Catalogue Data Printable.xls* and *Sphagnum Catalogue Database.xls*. The former is in a printable format and the latter is in a searchable format. In the latter, any word (for instance the name of a locality or collector) can be found by using the normal Find function (in the dropdown menu from Edit). It can also be reordered by any column using the normal Sort function (drop down menu under Data). Select all columns of data before sorting. Note that, in reordering the catalogue by 'Country/Vice-county', Irish specimens (vice-counties starting with an 'H') will be placed amongst the list of countries.

The arrangement of the catalogue is the same as that of the Herbarium, see section 1.1.3, page 4. Notes and abbreviations on each column are given below. Note that in the printable version of the catalogue, the scientific name and collection details have been combined into one column.

Scientific Name: This contains the accepted species name for each specimen.



In the printable version of the catalogue, there are links to H.L.K. Whitehouse stereoscopic slide images of most *Sphagnum* species. Links are accessible by clicking on the *Sphagnum* icons (as shown on the left), placed alongside the species name. To find out more about the stereoscopic slides see section 1.1.1., page 3.

Collections Details: This contains the collection details for each specimen. BBSUK specimens have been marked with an asterisk. The collection details on locality and habitat is followed by altitude and grid reference (if recorded). These are literally transcribed. British locality grid references are usually in the 100 km square format (see the Ordnance Survey Website, 2009). Some grid references are written as tetrads (see the Bird Trust for Ornithology website (2009)).

Historic changes to national boundaries mean that some country localities recorded at the time of collection, may differ from current country circumscriptions.

The National Vegetation Classification (NVC) may occasionally be noted in this column. This system is used to classify vascular plant communities within the UK (Rodwell 2006).

Collector/Collection Date: 'Unknown' in the collectors/collection date column indicates either a lack of data on the packet, or that it is illegible.

Identifier: Identity of the person responsible for the determination, other than the original collector.

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Appendix 3 : List of Species and Synonyms

This is the list of the species used in this catalogue including synonyms. Accepted names are shown in bold. For more detail on species, see the Species synopsis in section 2.3, page 14.

- S. acutifolium* Ehrh. ex Schrad. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *arctum* Braithw. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
S. acutifolium var. *deflexum* Schimp. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *elegans* see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *flavescens* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *flavo-rubellum* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *fuscum* Schimp. see *S. fuscum* (Schimp.) Klinggr.
S. acutifolium var. *griseum* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *intermedium* Wils. see *S. warnstorffii* Russ.
S. acutifolium var. *laetevirens* Braithw. see *S. subnitens* Russ. & Warnst.
S. acutifolium var. *leptocladum* Limpr. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
S. acutifolium var. *lilacinum* Spruce see *S. russowii* Warnst.
S. acutifolium var. *luridum* Hüb. see *S. subnitens* Russ. & Warnst.
S. acutifolium var. *obscurum* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *pallescens* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *patulum* Schimp. see *S. russowii* Warnst.
S. acutifolium var. *purpurascens* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *purpureum* Schimp. see *S. subnitens* Russ. & Warnst.
S. acutifolium var. *pusillum* (Röll) see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *quinquefarium* Lindb. see *S. quinquefarium* (Lindb. ex Braithw.) Warnst.
S. acutifolium var. *robustum* Russ. see *S. russowii* Warnst.
S. acutifolium var. *roseum* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *rubellum* Wils. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
S. acutifolium var. *rubrum* Brid. ex. Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *subnitens* Dix. see *S. subnitens* Russ. & Warnst.
S. acutifolium var. *versicolor* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. acutifolium var. *viride* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.
***S. acutum* Warnst. var. *hakusanense* Warnst.**
***S. affine* Ren. & Card.**
S. amblyphyllum (Russ.) Warnst. see *S. flexuosum* Dozy & Molk.
S. amblyphyllum var. *macrophyllum* Warnst. see *S. flexuosum* Dozy & Molk.
S. amblyphyllum var. *mesophyllum* Warnst. see *S. flexuosum* Dozy & Molk.
S. amblyphyllum var. *parvifolium* Warnst. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.
S. amblyphyllum var. *tenue* Warnst. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.
S. andersonianum Andrus. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
***S. angermanicum* Melin**
***S. angustifolium* (C.Jens. ex Russ.) C.Jens.**
***S. annulatum* Lindb.f. ex Warnst.**
S. annulatum var. *porosum* (Schlieph. & Warnst.) Maass & Isov. see *S. jensenii* Lindb.
S. annulatum var. *tereti-ramosum* see *S. annulatum* Lindb.f. ex Warnst.
S. antillarum Schimp. see *S. capillifolium* (Ehrh.) Hedw. s.l.
***S. aongstroemii* C.Hartm.**
S. apiculatum Lindb. see *S. fallax* (Klinggr.) Klinggr.
S. aquaticum Warnst. var. *turgidum* Warnst. see *S. cuspidatum* Ehrh. ex Hoffm.
S. aquatile Warnst. (and infra-specific taxa) see *S. denticulatum* Brid.

- S. armoricum* Warnst. see *S. denticulatum* Brid.
S. artariae Warnst. see *S. contortum* K.F.Schultz
S. auriculatum Schimp. (and infraspecific taxa except var. *inundatum*) see *S. denticulatum* Brid.
S. auriculatum var. *inundatum* (Russ.) M.O.Hill see *S. inundatum* Russ.
S. austinii Sull. ex Aust.
S. austinii var. *imbricatum* see *S. austinii* Sull. ex Aust.
S. australe Mitt.
S. balticum (Russ.) Russ. ex C.Jens.
S. bartlettianum Warnst. see *S. quinquefarium* (Lindb. ex Braithw.) Warnst.
S. bavaricum Warnst. see *S. denticulatum* Brid.
S. bavaricum var. *mesophyllum* Warnst. see *S. denticulatum* Brid.
S. bavaricum var. *microphyllum* Warnst. see *S. denticulatum* Brid.
S. beccarii Hamp.
S. brevifolium (Lindb. ex Braithw.) Röhl emend. Flatberg see *S. fallax* (Klinggr.) Klinggr.
S. camusii (Card.) Warnst. see *S. denticulatum* Brid.
S. camusii var. *plumosum* Warnst. see *S. denticulatum* Brid.
S. camusii var. *venustum* Warnst. see *S. denticulatum* Brid.
S. capillaceum (Weiss) Schrank see *S. capillifolium* (Ehrh.) Hedw. s.l.
S. capillaceum var. *tenellum* (Schimp.) Andrus. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
S. capillifolium (Ehrh.) Hedw. s.l.
S. capillifolium ssp. rubellum (Wils.) M.O.Hill
S. capillifolium var. tenerum (Sull. & Lesq. Ex Sull.) Crum.
S. carlottae Andrus. see *S. imbricatum* Hornsch. ex Russ.
S. carolinianum Andr.
S. centrale C.Jens. see *S. palustre* var. *centrale* (C.Jens.) A.Eddy
S. centrale var. *glaucescens* Warnst. see *S. palustre* var. *centrale* (C.Jens.) A.Eddy
S. compactum Lam. & DC.
S. compactum Lam. & DC. (infra-specific taxa) see *S. compactum* Lam. & DC.
S. contortum K.F.Schultz (infra-specific taxa; except var. *obesum*, var. *teretiusculum* and var. *warnstorffii*) see *S. contortum* K.F.Schultz
S. contortum K.F.Schultz
S. contortum var. *obesum* Wils. see *S. denticulatum* Brid.
S. contortum var. *teretiusculum* Röhl see *S. denticulatum* Brid.
S. contortum var. *warnstorffii* see *S. denticulatum* Brid.
S. crassicladum Warnst. (and infra-specific taxa) see *S. denticulatum* Brid.
S. cristatum Hpe.
S. curvifolium Wils. see *S. contortum* K.F.Schultz
S. cuspidatum Ehrh. ex Hoffm.
S. cuspidatum (infra-specific taxa except var. *brevifolium*, var. *majus*, var. *miquelonense*, var. *serrulatum* and var. *torreyanum*) see *S. cuspidatum* Ehrh. ex Hoffm.
S. cuspidatum var. *brevifolium* Lindb. see *S. balticum* (Russ.) Russ. ex C.Jens.
S. cuspidatum var. *majus* Russ. see *S. majus* (Russ.) C.Jens.
S. cuspidatum var. *miquelonense* (Ren. & Card. e.p.) Warnst. see *S. torreyanum* Sull.
S. cuspidatum var. serrulatum (Schleiph.) Schleiph.
S. cuspidatum var. *serratum* (Aust.) Lesq. et. James. see *S. cuspidatum* var. *serrulatum* (Schleiph.) Schleiph.
S. cuspidatum var. *torreyanum* (Sulliv.) Lesq. & James. see *S. torreyanum* Sull.
S. cyclophyllum Sull. & Lesq.
S. cymbifolium (Ehrh.) Hedw. (and infra-specific taxa; except var. *congestum* and var. *purpurascens*) see *S. palustre* L.
S. cymbifolium var. *congestum* Schimp. see *S. magellanicum* Brid.
S. cymbifolium var. *purpurascens* Russ. see *S. magellanicum* Brid.
S. davidii Warnst. var. flavofuscens Warnst.

S. denticulatum Brid.

S. denticulatum var. *plumosum* Warnst. see *S. denticulatum* Brid.

S. derrumbense Warnst. see *S. palustre* L.

S. drepanocladum Warnst. see *S. falcatulum* Bresch.

S. dusenii (C.Jens.) Russ. & Warnst. (and infra-specific taxa) see *S. majus* (Russ.) C.Jens.

S. erythrocalyx Hamp.

S. falcatulum Bresch.

S. falcatulum var. *microporum* see *S. falcatulum* Bresch.

S. fallax (Klinggr.) Klinggr.

S. fallax (infra-specific taxa) see *S. fallax* (Klinggr.) Klinggr.

S. fimbriatum (infra-specific taxa) see *S. fimbriatum* Wils.

S. fimbriatum Wils.

S. fitzgeraldii Ren.& Card.

S. flavicomans (Card.) Warnst.

S. flexuosum Dozy & Molk.

S. flexuosum var. *fallax* (Klinggr.) M.O.Hill ex A.J.E.Smith see *S. fallax* (Klinggr.) Klinggr.

S. flexuosum var. *tenuis* M.O.Hill ex A.J.E.Smith see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.

S. franconiae Warnst. (and infra-specific taxa) see *S. denticulatum* Brid.

S. fuscum (Schimp.) Klinggr.

S. fuscum (infra-specific taxa) see *S. fuscum* (Schimp.) Klinggr.

S. garberi Lesq. & James. see *S. strictum* Sull.

S. girgensohnii Russ.

S. girgensohnii (infra-specific taxa) see *S. girgensohnii* Russ.

S. gravetii Russ see *S. denticulatum* Brid.

S. gravetii Warnst. see *S. denticulatum* Brid.

S. guwassanense Warnst.

S. guwassanense var. *takedae* (Okam.) Suzuki

S. hakkodense var. *condensum* see *S. papillosum* Lindb.

S. hakkodense Warnst. & Card. see *S. papillosum* Lindb.

S. hamiltoni Dix.

S. henryense Warnst.

S. hercynicum Warnst. see *S. inundatum* Russ.

S. hercynicum var. *binsteadii* Wheld. see *S. inundatum* Russ.

S. heterophyllum Warnst. see *S. palustre* L.

S. holtii Warnst. see *S. denticulatum* Brid.

S. imbricatum Hornsch. ex Russ.

S. imbricatum ssp. *affine* Ren.& Card. see *S. affine* Ren.& Card.

S. imbricatum ssp. *austinii* (Sull.) Flatberg see *S. austinii* Sull. ex Aust.

S. imbricatum var. *cristatum* Warnst. see *S. imbricatum* Hornsch. ex Russ.

S. imbricatum var. *sublaeve* Limpr. ex Warnst. see *S. imbricatum* Hornsch. ex Russ.

S. insulosum Ångstr. see *S. aongstroemii* C.Hartm.

S. intermedium Hoffm. see *S. flexuosum* Dozy & Molk.

S. intermedium Hoffm. var. *pulchrum* Lindb. in Braithw. see *S. pulchrum* (Lindb. ex Braithw.) Warnst.

S. intermedium Russ. see *S. palustre* L.

S. intermedium var. *amblyphyllum* see *S. flexuosum* Dozy & Molk.

S. intermedium var. *majus* see *S. flexuosum* Dozy & Molk.

S. intermedium var. *riparium* Lindb. see *S. riparium* Ångstr.

S. inundatum Russ.

S. inundatum (infra-specific taxa) see *S. inundatum* Russ.

S. isoviitae see *S. fallax* (Klinggr.) Klinggr.

S. jensenii Lindb.

S. junghuhnianum Dozy & Molk.

S. khasianum Mitt.

S. klinggraeffii Röhl var. *brachycladum* Röhl see *S. palustre* L.

S. klinggraeffii var. *pyncocladum* see *S. palustre* L.

S. kushiroense Suzuki.

S. laricinum (Wils.) Spruce ex Ängstr. (and infra-specific taxa except var. *teretiusculum* and var. *platyphyllum*) see *S. contortum* K.F.Schultz

S. laricinum var. *teretiusculum* Lindb. see *S. platyphyllum* (Lindb. ex Braithw.) Sull.

S. laricinum var. *platyphyllum* Lindb. see *S. platyphyllum* (Lindb. ex Braithw.) Sull.

S. lenense Lindb.

S. lescurii Sull. see *S. denticulatum* Brid.

S. lindbergii Schimp. ex Lindb.

S. lindbergii (infra-specific taxa) see *S. lindbergii* Schimp. ex Lindb.

S. ludovicianum (Ren.& Card.) Warnst. see *S. erythrocalyx* Hamp.

S. luzonense Warnst.

S. macrophyllum Bernh. ex Brid.

S. macrophyllum var. floridanum Aust.

S. magellanicum Brid.

S. magellanicum (infra-specific taxa) see *S. magellanicum* Brid.

S. majus (Russ.) C.Jens.

S. medium Lindb. (and infra-specific taxa) see *S. magellanicum* Brid.

S. mendocinum Sull.& Lesq.

S. meridense (Hamp.) C.Müll.

S. mexicanum var. *ecuadorensis* Warnst. see *S. strictum* Sull.

S. microcarpum Warnst. see *S. cyclophyllum* Sull. & Lesq.

S. microporum Warnst.

S. molle Sull.

S. molle (infra-specific taxa) see *S. molle* Sull.

S. molluscum Bruch (and infra-specific taxa) see *S. tenellum* (Brid.) Pers. ex Brid.

S. muelleri Schimp. see *S. molle* Sull.

S. neglectum Ängstr. see *S. platyphyllum* (Lindb. ex Braithw.) Sull.

S. nemoreum Scop. see *S. capillifolium* (Ehrh.) Hedw. s.l.

S. novo-zelandicum Mitt.

S. obesum (Wils.) Warnst. (and infra-specific taxa) see *S. denticulatum* Brid.

S. obtusum (infra-specific taxa) see *S. obtusum* Warnst.

S. obtusum Warnst.

S. okamurae see *S. microporum* Warnst.

S. orlandense Warnst. see *S. inundatum* Russ.

S. otagense Warnst. see *S. cristatum* Hpe.

S. palustre L.

S. palustre var. centrale (C.Jens.) A.Eddy

S. palustre var. *laxum* Warnst. see *S. palustre* L.

S. papillosum Lindb.

S. papillosum (infra-specific taxa except var. *intermedium*) see *S. papillosum* Lindb.

S. papillosum var. *intermedium* (Russ.) Warnst. see *S. palustre* var. *centrale* (C.Jens.) A.Eddy

S. parvifolium Warnst. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.

S. parvifolium var. *tenue* (Klinggr.) Warnst. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.

S. parvulum Warnst. var. *flavescens* Warnst. see *S. capillifolium* (Ehrh.) Hedw. s.l.

S. perichaetiale Hampe see *S. erythrocalyx* Hamp.

S. planifolium C. Müll.

S. platyphyllum (Lindb. ex Braithw.) Sull.

S. platyphyllum (Lindb.) Warnst. (infra-specific taxa of) see *S. platyphyllum* (Lindb. ex Braithw.) Sull.

S. plumulosum Röhl (and infra-specific taxa except var. *flavo-fuscescens*) see *S. subnitens* Russ. & Warnst.

- S. plumulosum* var. *flavo-fuscescens* Warnst. see *S. palustre* L.
- S. portoricense** Hamp.
- S. pseudo-rufescens* Warnst. see *S. subsecundum* Nees
- S. pulchrum** (Lindb. ex Braithw.) Warnst.
- S. pulchrum* (infra-specific taxa) see *S. pulchrum* (Lindb. ex Braithw.) Warnst.
- S. pylaesii** Brid.
- S. pylaesii** var. *sedoides* (Brid.) Lindb.
- S. pylaiei* Braithw. see *S. pylaesii* Brid.
- S. pylaiei* var. *ramosum* Warnst. see *S. pylaesii* Brid.
- S. quinquefarium** (Lindb. ex Braithw.) Warnst.
- S. quinquefarium* (infra-specific taxa) see *S. quinquefarium* (Lindb. ex Braithw.) Warnst.
- S. quinquefarium* var. *brachycladum* (Röll) Röll see *S. subnitens* Russ. & Warnst.
- S. recurvum** P.Beauv. (Non-European specimens)
- S. recurvum* P.Beauv. s.l. (European specimens) see *S. flexuosum* Dozy & Molk.
- S. recurvum* var. *amblyphyllum* (Russ) Warnst. see *S. flexuosum* Dozy & Molk.
- S. recurvum* ssp. *angustifolium* (C.Jens.) Russ. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.
- S. recurvum* var. *majus* (Ängstr. ex Warnst.) Warnst. see *S. flexuosum* Dozy & Molk.
- S. recurvum* var. *mucronatum* (Russ.) Warnst. see *S. fallax* (Klinggr.) Klinggr.
- S. recurvum* var. *parvifolium* Warnst. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.
- S. recurvum* var. *parvulum* Warnst. see *S. fallax* (Klinggr.) Klinggr.
- S. recurvum* var. *pulchrum* Lindb. see *S. pulchrum* (Lindb. ex Braithw.) Warnst.
- S. recurvum* var. *riparioides* Warnst. see *S. obtusum* Warnst.
- S. recurvum* var. *robustum* Breidl. see *S. flexuosum* Dozy & Molk.
- S. recurvum* var. *sylvaticum* Russ. see *S. flexuosum* Dozy & Molk.
- S. recurvum* var. *tenuis* Klinggr. see *S. angustifolium* (C.Jens. ex Russ.) C.Jens.
- S. rigidum* (Nees & Hornsch.) Schimp. (and infra-specific taxa) see *S. compactum* Lam. & DC.
- S. riparioides* Warnst. see *S. flexuosum* Dozy & Molk.
- S. riparium** Ängstr.
- S. riparium* (infra-specific taxa) see *S. riparium* Ängstr.
- S. robustum* (Russ.) Röll see *S. russowii* Warnst.
- S. robustum* (Warnst.) Card. (and infra-specific taxa) see *S. russowii* Warnst.
- S. robustum* (Warnst.) Röll see *S. russowii* Warnst.
- S. rubellum* Wils (and infra-specific taxa) see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill
- S. rufescens* Limpr. (and infra-specific taxa) see *S. denticulatum* Brid.
- S. russowii** Warnst.
- S. russowii* (infra-specific taxa of) see *S. russowii* Warnst.
- S. schimperii* (Warnst.) Röll var. *densum* Röll see *S. capillifolium* (Ehrh.) Hedw. s.l.
- S. sedoides* Brid. see *S. pylaesii* var. *sedoides* (Brid.) Lindb.
- S. sericeum** C.Müll.
- S. serratum* Aust. var. *serrulatum* Warnst. see *S. cuspidatum* Ehrh. ex Hoffm.
- S. skyense** Flatberg
- S. sparsum** Hampe
- S. squarrosum** Crome
- S. squarrosum* (infra-specific taxa) see *S. squarrosum* Crome
- S. strictum* Lindb. see *S. girgensohnii* Russ.
- S. strictum** Sull.
- S. strictum* var. *gracilcesens* see *S. strictum* Sull.
- S. strictum** ssp. *pappeanum* (C.Müll.) A.Eddy
- S. strictum* var. *subsquarrosum* Warnst. see *S. strictum* Sull.
- S. subbicolor* Hamp. (and infra-specific taxa) see *S. palustre* var. *centrale* (C.Jens.) A.Eddy
- S. subfulvum* Sjörs (from within Britain or Ireland) see *S. subnitens* Russ. & Warnst.
- S. subfulvum** Sjörs (from outside of Britain or Ireland)

S. submolliculum Warnst. var. *validum* Warnst. see *S. subsecundum* Nees

***S. subnitens* Russ. & Warnst.**

S. subnitens (infra-specific taxa except for var. *ferrugineum*) see *S. subnitens* Russ. & Warnst.

***S. subnitens* var. *ferrugineum* (Flatberg) M.O.Hill**

S. subnitens var. *flavicomans* Card. see *S. flavicomans* (Card.) Warnst.

***S. subobesum* Warnst.**

***S. subrecurvum* Warnst.**

***S. subsecundum* Nees**

S. subsecundum (infra-specific taxa except for var. *contortum*, ssp. *inundatum*, var. *mesophyllum* and var. *robustum*) see *S. subsecundum* Nees

S. subsecundum var. *contortum* (Schultz) Hüb. see *S. contortum* K.F.Schultz

S. subsecundum ssp. *inundatum* (Russ.) C.Jens. see *S. inundatum* Russ.

S. subsecundum var. *mesophyllum* Warnst. see *S. contortum* K.F.Schultz

S. subsecundum var. *robustum* Warnst. see *S. platyphyllum* (Lindb. ex Braithw.) Sull.

S. subtile (Russ.) Warnst. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill

***S. tenellum* (Brid.) Pers. ex Brid.**

S. tenellum var. *rubellum* (Wils.) Warnst. see *S. capillifolium* ssp. *rubellum* (Wils.) M.O.Hill

S. tenellum (infra-specific taxa of) see *S. tenellum* (Brid.) Pers. ex Brid.

S. tenerum (Aust.) Warnst. (and infra-specific taxa) see *S. capillifolium* (Ehrh.) Hedw. s.l.

S. tenerum Sull. & Lesq. see *S. capillifolium* var. *tenerum* (Sull. & Lesq. Ex Sull.) Crum.

***S. teres* (Schimp.) Ångstr.**

S. teres (infra-specific taxa) see *S. teres* (Schimp.) Ångstr.

***S. torreyanum* Sull.**

S. trichophyllum var. *novozelandica* see *S. falcatum* Bresch.

S. trinitense C.Müll. var. *lorifolium* Roth. see *S. cuspidatum* Ehrh. ex Hoffm.

***S. tumidulum* Besch.**

S. turfaceum Warnst. see *S. affine* Ren. & Card.

S. wardellense Warnst. see *S. cristatum* Hpe.

***S. warnstorffii* Russ.**

S. warnstorffii (infra-specific taxa of) see *S. warnstorffii* Russ.

***S. wulfianum* Girg.**

S. wulfianum (infra-specific taxa of) see *S. wulfianum* Girg.

S. zickendrathii Warnst. see *S. obtusum* Warnst.